

ENVIRONMENTAL AWARENESS AND PAPER RECYCLING

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Received November 11, 2009

The collection and utilization of recovered paper has increased over the past decades all over the world and this trend will continue. However, paper recycling is limited by the availability of resources, as well as by their recovery and quality. The paper describes how environmental awareness plays an important role in overcoming these limits. Firstly, the works carried out within the framework of COST Action E48 – “The limits of paper recycling” – are presented. These works have analysed the most important driving forces for extending the collection of recovered paper in Europe and established that environmental awareness is a key factor. Secondly, different initiatives for the development of environmental awareness and promotion of paper recycling – mainly based on information and educational campaigns, with special emphasis on child education – are presented.

Keywords: environmental awareness, paper recycling, collection of recovered paper, information and education, COST Action E48

INTRODUCTION

Over the past decades, the recovery and utilization of used paper has increased throughout the world and this trend will continue. Worldwide, the use of recovered paper has increased from 117 million tons in 1995 to 206 million tons in 2007, thus increasing the share of recovered paper from 41 to 52% of the total paper and board industry raw material.¹ In Europe, after the success of the first European Declaration on Paper Recycling (2000-2005), a new voluntary commitment by the paper recycling chain was signed for the period 2006-2010, with the challenge of achieving² a recycling rate of 66% by 2010. This objective has already been attained³ by 2008, which means that 49.95 million tons of recovered paper were recycled, strengthening the position of Europe as the global leader in paper recycling.

Paper recycling induces numerous environmental benefits, apart from reducing the use of wood as raw material and from avoiding landfilling with used paper. Paper manufacturing based on recovered paper also consumes less water and energy per ton of product, thus decisively contributing to the sustainability of the sector.⁴⁻⁵ To achieve a higher use of recovered paper as a raw

material in the paper and board industry, it is necessary to increase its availability, by examining existing or new sources. At a European level, a rough estimation of the different sources indicates that 50% of the recovered paper is collected from industry and trade, 40% from households and 10% from offices,⁶ although these percentages can differ greatly among countries, as well as among the collection systems employed. These are exploited very differently. First, the sources of high quality and high generation by volume are exploited, followed by others, of lower quality and low volume, e.g. households. The future potential for recovered collection clearly lies in households, as other sources (mainly industrial and trade) have, to a great extent, already been tapped. However, it is generally accepted that an extended recovered paper collection is always detrimental to quality.⁷⁻⁸ The quality of the recovered paper has been considered as the major threat to an extended use of recovered paper in the paper industry.⁹

Without efforts on source segregation and separate collection from households, which are major prerequisites for sustainable recycling, it would be very difficult to extend the use of recovered paper as a raw material

in the papermaking industry.¹⁰ Consequently, the participation of households is the key to achieving higher recoveries of paper, as well as to providing raw material of high quality with little, if any, need for sorting (lower cost process), due to separation at source.

Citizens' participation is thus considered the touchstone for the success of any recycling scheme.¹¹ However, to join collection systems requires investment of time, storage space, money and effort from the participants.¹²⁻¹³ The participation in recycling programmes is greatly influenced by motivation, through extrinsic or intrinsic rewards. Usually, extrinsic rewards consist of payment for the collected materials. This solution can be very effective, however, it produces only "short-term changes" and does not continue on its own, when inducement is withdrawn.¹⁴⁻¹⁵ Similarly, "pay-as-you-throw" schemes can be considered as extrinsic (negative) rewards. These schemes have been reported to have a positive impact on selective collection results, especially if modern fee systems are applied.¹⁶ However, they may involve some risk, *i.e.* pressure on the "refused fraction" can lead to illegal dumping, by placing it in the containers intended for certain selectively collected wastes, such as packaging.^{10,17}

On the other hand, intrinsic rewards fulfil a person's need to have an impact on the world, producing satisfaction to individuals. The behaviour is more likely to continue if a person has a strong reason to persist and to feel self-directed.¹⁸ Environment protection has been cited as the main reason why people recycle; most people view the recycling activity as one of the most tangible actions that can be undertaken to contribute to a healthier environment.¹⁹ For these reasons, intrinsic behaviour tends to last longer than the extrinsically motivated one. Recycling has traditionally occurred because it has been economical. However, from the 70s onwards, the perception in modern rich societies has been that we should recycle even more. Now, we live in an age of escalating environmental awareness, in which recycling occurs at an increasing scale and in almost every area of the society, where local and national authorities use both economic and political instruments in their attempts to make households contribute to a sustainable development through recycling.²⁰ In less developed countries, an increase in environmental awareness by itself is not

enough to improve participation, so that still extrinsic rewards are necessary, at least in the first implementation stages of the recycling schemes.^{11,14,21}

Environmental awareness is important to promote not only recovery, but also recycling in general (environmental pro-attitudes). Consumer interest in environmental issues and the consequent pro-active approach to legislation also result in earlier restrictive environmental legislation, as increased costs for landfill and incineration.²²⁻²³ Consumers can also help persuade firms to be environmentally friendly and to develop innovative green products and services by the choices they make. According to the 6th Environment Action Programme of the European Union,²⁴ helping people to make environmentally friendly choices, while adopting greener lifestyles, is one of the main approaches for attaining success in the preservation of natural resources and in waste management.

A prediction of individuals' behaviour towards recycling should be really complex, covering very different aspects. Thus, P. W. Schultz *et al.*¹⁴ made a very detailed review of the factors influencing recycling, both personal (environmental attitudes, knowledge about the recycling programme, demographic variables, personality variables) and situational factors (prompting, commitment interventions, social norms, goal-setting, rewards, etc.). Some of the most important factors have been determined to be: beliefs about recycling convenience (environmental awareness), social pressure, economic motives, familiarity with the recycling infrastructure, opinion about the recycling infrastructure and services, etc.^{12,25-}

²⁷ However, the development of citizens' environmental awareness is generally considered as the most important prerequisite for motivating the participation and for changing their behaviour towards recycling activities. Environmental awareness can be developed at a basic level by education and consumer information. In recognition of this, the trend in recycling policy and legislation is geared towards promoting people-centred approaches in recycling, with public education as the main driver towards increasing public participation.¹¹ Several tools can be used for such ends, namely public information, environmental awareness campaigns, education partnership with other stakeholders, children education program-

mmes, etc. Through intensive communication and media-effective activities and campaigns, environmental awareness can be developed, promoting the separation of recyclables from municipal solid waste, as well as recycling and recovery of paper, plastics, etc.

The development of environmental awareness is of such importance that the United Nations has designated the period 2005 to 2014 as the decade of “Education for Sustainable Development”. This initiative tries to integrate the concept of sustainable development in education processes all around the world, environmental education being an integral aspect of this concept. In the same way, the European Union has considered environmental education as one of the pillars of sustainable environmental development.²⁴ The European Union has promoted environmental education, by including environmental issues in school curricula, as one of the best ways to raise environmental awareness, and will continue promoting good practice and sharing ideas for improving people’s access to environmental information. Consumer information and education are considered to be prerequisites for achieving long-term changes in consuming behaviour towards a sustainable society and a sound market for secondary raw materials.

The present review presents first the most important driving forces for the collection of recovered paper identified within the framework of COST Action E48 “The limits of paper recycling” and, second, the available tools for increasing citizens’ environmental awareness, including practical examples showing different initiatives carried out in Europe.

INFLUENCE OF ENVIRONMENTAL AWARENESS ON RECOVERED PAPER COLLECTION

Background

In a previous survey among the members of COST E48 Action, entitled “Identification of factors influencing the competitiveness of recycling pulp and board industry”, the relative importance of the main issues affecting the different stages of the recovered paper processing chain were quantified, with the aim of extending the use of recovered paper as a raw material for recycling.⁹ The effect of the social, technical, economical, environmental and legislative issues on

collecting recovered paper, sorting of recovered paper, paper production (structure and technologies), printing, converting and treatment techniques were evaluated. The results confirmed that social issues, specifically environmental awareness, represent one of the main factors influencing paper recycling through virtually all stages of paper recycling. The collection of recovered paper has increased, the quality is higher and the sorting costs are lower due to sorting at source. Besides, paper production can now use increased volumes of recovered paper, due to consumers’ willingness to use recycled products. Finally, printing and converting industries are forced to produce more recyclable paper products (by consumers’ pressure on legislation and regulations, for example), the use of eco-design criteria being necessary for producing eco-friendly printing inks, adhesives, tetra-bricks, etc.

After this first survey, a new study was carried out for specifically evaluating which driving forces exactly influence the collection of recovered paper, within a broad spectrum of European countries with very different collection rates. The estimation of environmental awareness in these countries and its influence on achieving higher collection rates were analyzed in detail.

METHODS

In the study, the correlation between the collection rates and different variables was assessed. The studied variables were the following:

- socio-economic variables: affluence (GDP per capita), education (public expenditure as %GDP) and population density;
- market conditions and structure of the paper and board industry: utilization of recovered paper (utilization rate, recycling rate) and deficit of recovered paper;
- municipal waste generation (in kg per capita per year);
- environmental certifications (ISO 14001 certifications and EMAS registrations), quality certifications (ISO 9000) and forestry certifications (PEFC);
- environmental awareness.

The collection rate is defined as the recovered paper collected divided by the paper and board consumed, expressed in percent. This value indicates the development degree of the collecting activities in a country, as the volume of recovered paper collected is related to all paper that could be theoretically collected (paper and board consumed). At a European level, great

differences exist among different countries (Fig. 1), three groups of countries being very clearly defined: those with a collection rate around 50%, those with a collection rate around 60% and those with collection rates between 70% and 80%.

The collection rates in 2005 have been those used to investigate the relationship among the different variables. These statistics consider the collection rate of 20 European countries: EU-15 (except Luxembourg) plus Czech Republic, Hungary, Norway, Poland, Slovakia and Switzerland. The update of the collection rates (with data from 2008) has not been considered because the estimation of environmental awareness has since changed, which is one of the reasons for the great improvement in the average collection rate in Europe in recent years: from 53.6% in 2000 to 63.8% in 2005 and 67.1% in 2008. This is even more remarkable when we consider that, during this period, more Eastern countries (those with the lowest collection rates) have joined CEPI and are now included in CEPI statistics.

Estimation of environmental awareness

Environmental awareness is a very difficult parameter to be estimated objectively. Most of the studies use subjective approaches based on questionnaires or interviews, such as the "Green Moral Index" of C. Berglund *et al.*,²⁰ based on individuals' perception of some environmental issues. In the study of recycling activities, it is also helpful to determine the "willingness to sort" or "willingness to pay", as an indication of the environmental awareness in this specific issue.²⁸⁻³⁰ Such tools provide interesting results, but the expressed willingness to sort and recycle should not be confused with the actual recycling rate. Generally, the expressed willingness to recycle is significantly higher than the actual rate.³¹

The approach followed in this study consists in a subjective estimation of environmental awareness performed by a panel of experts from different European countries involved in COST Action E48, based on their experience and knowledge of their country. To this end, a template was created and distributed among the members of the Action, consisting of a list of 31 European countries (EU-27 + Norway, Switzerland, Turkey and Russia), and the respondents were asked to classify the general environmental awareness as high, medium or low, according to their expertise. It was recommended that the respondents should not fill in anything if they did not have enough knowledge of a country to be able to produce an accurate estimation of the environmental awareness. A total of 21 questionnaires were received, the results obtained being shown in Table 1. To facilitate a further analysis of the results, a numerical environmental awareness value has been calculated from the responses

received. This value represents the average of the responses recorded, with a rate of 3 for high environmental awareness, 2 for medium environmental awareness and 1 for low environmental awareness.

RESULTS

Socio-demographic variables

It has been traditionally suggested that affluence and education are the main socio-demographic variables related to recycling participation,^{12,32-33} although other studies show that these variables are not statistically significant, while age and ethnicity are.³⁴

All statistics on the socio-economic variables have been obtained from Eurostat for the year 2005. Firstly, the influence of affluence has been studied by GDP per capita (Fig. 2a). A significant correlation has been observed with the collection rate. Higher income implies higher collection rates ($R = 0.808$), as observed by other authors.^{12,33} Secondly, the influence of education has been studied, with public expenditure on education (as % of the GDP) as an index. However, in this case, the results have shown that education (measured with this indicator) does not have a significant impact at a national level ($R = 0.267$) (Fig. 2b), as also observed by S. F. Sidique *et al.*¹² Population density has also been analysed. In some cases, low population densities are viewed as a barrier for higher recovery rates, because the collection of recovered paper in a dispersed area is not economical. However, no correlation was observed between the collection rate and population density ($R = 0.089$) (Fig. 2c). Nordic countries, for example, have the lowest population densities (14-22 inhabitants per km²), but the highest collection rates of recovered paper (70-74%).

Although an important correlation with the income has been obtained (at a national level), other socio-demographic variables are not so important for the collection rate of the countries under study. In general, the major part of the studies indicate that socio-demographic variables account for only a small portion of the variation in consumer behaviour towards recycling.^{25,35}

Market conditions: utilization rates and deficit of recovered paper

The utilisation of recovered paper by the industry can be a determining factor in promoting a further recovery of paper. In an

ideal recycling environment, there would be a maximum collection of recovered paper, thus leading to high utilisation levels of the recovered fibre. In practice, this can be rarely achieved, since there is seldom a balance between the availability of recovered paper and a sufficiently developed paper and board industry capable of utilising it.²² High collection levels may be achieved, but the recovered fibre generated may not be always wholly utilised in the domestic industry of that particular country, thus, for example, high volumes of recovered paper (around 11 million tons) are exported from CEPI countries to the Far East, especially China.³⁶

The values of the variables used for assessing the importance of market conditions on the collection rate have been obtained⁶ through CEPI.

If the utilisation rate is used as an independent variable, there is no correlation between the collection and the utilisation rate in different European countries ($R = 0.009$) (Fig. 2d). The utilisation rate represents the ratio between the recovered paper utilised in paper industry and paper production, expressed as percentage. In principle, a higher utilisation of recovered paper in the domestic paper industry should promote a higher collection rate, but this is not the case.

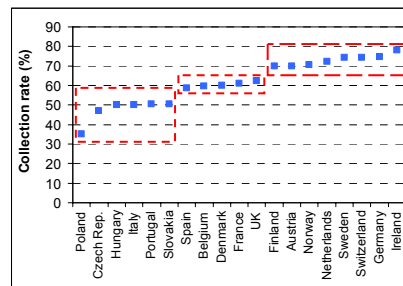


Figure 1: Recovered paper collection rate in European countries

Table 1
Estimation of environmental awareness in European countries

| Country | No. of responses | No. responses high env. awar. (% total) | No. responses medium env. awar. (% total) | No. responses low env. awar. (% total) | Average env. awar. | Std. dev. |
|----------------|------------------|---|---|--|--------------------|-----------|
| Austria | 18 | 17 (94%) | 1 (6%) | 0 (0%) | 2.94 | 0.24 |
| Belgium | 17 | 6 (35%) | 8 (47%) | 3 (18%) | 2.18 | 0.73 |
| Czech Republic | 7 | 0 (0%) | 5 (71%) | 2 (29%) | 1.71 | 0.49 |
| Denmark | 14 | 12 (86%) | 2 (14%) | 0 (0%) | 2.86 | 0.36 |
| Finland | 16 | 13 (81%) | 3 (19%) | 0 (0%) | 2.81 | 0.40 |
| France | 18 | 0 (0%) | 16 (89%) | 2 (11%) | 1.89 | 0.32 |
| Germany | 21 | 20 (95%) | 1 (5%) | 0 (0%) | 2.95 | 0.22 |
| Greece | 15 | 0 (0%) | 2 (13%) | 13 (87%) | 1.13 | 0.35 |
| Hungary | 10 | 0 (0%) | 5 (50%) | 5 (50%) | 1.50 | 0.53 |
| Ireland | 11 | 3 (27%) | 4 (36%) | 4 (36%) | 1.91 | 0.83 |
| Italy | 16 | 0 (0%) | 12 (75%) | 4 (25%) | 1.75 | 0.45 |
| Luxembourg | 12 | 8 (67%) | 4 (33%) | 0 (0%) | 2.67 | 0.49 |
| Netherlands | 19 | 18 (95%) | 1 (5%) | 0 (0%) | 2.95 | 0.23 |
| Norway | 14 | 9 (64%) | 4 (29%) | 1 (7%) | 2.57 | 0.65 |
| Poland | 9 | 0 (0%) | 5 (56%) | 4 (44%) | 1.56 | 0.53 |
| Portugal | 12 | 0 (0%) | 5 (42%) | 7 (58%) | 1.42 | 0.51 |
| Slovakia | 8 | 0 (0%) | 2 (25%) | 6 (75%) | 1.25 | 0.46 |
| Spain | 16 | 0 (0%) | 14 (88%) | 2 (13%) | 1.88 | 0.34 |
| Sweden | 18 | 18 (100%) | 0 (0%) | 0 (0%) | 3.00 | 0.00 |
| Switzerland | 20 | 18 (90%) | 2 (10%) | 0 (0%) | 2.90 | 0.31 |
| United Kingdom | 16 | 4 (25%) | 10 (63%) | 2 (12%) | 2.13 | 0.62 |
| Cyprus | 5 | 0 (0%) | 0 (0%) | 5 (100%) | 1.00 | 0.00 |

| | | | | | | |
|-----------|----|---------|----------|-----------|------|------|
| Estonia | 6 | 0 (0%) | 3 (50%) | 3 (50%) | 1.50 | 0.55 |
| Latvia | 6 | 1 (17%) | 2 (33%) | 3 (50%) | 1.67 | 0.82 |
| Lithuania | 5 | 0 (0%) | 3 (60%) | 2 (40%) | 1.60 | 0.55 |
| Malta | 2 | 0 (0%) | 2 (100%) | 0 (0%) | 2.00 | 0.00 |
| Slovenia | 10 | 20 (%) | 8 (80%) | 0 (0%) | 2.20 | 0.42 |
| Bulgaria | 7 | 0 (0%) | 2 (29%) | 5 (71%) | 1.29 | 0.49 |
| Romania | 9 | 0 (0%) | 2 (22%) | 7 (78%) | 1.22 | 0.44 |
| Turkey | 9 | 0 (0%) | 2 (22%) | 7 (78%) | 1.22 | 0.44 |
| Russia | 10 | 0 (0%) | 0 (0%) | 10 (100%) | 1.00 | 0.00 |

Another variable that can be relevant is the recycling rate, defined as the ratio between the recovered paper utilised in the paper industry and paper consumption, expressed as percentage. In this case, a slight correlation can be observed ($R = 0.634$) (Fig. 2e), yet data dispersion is still very high. Countries with similar recycling rates can have very different collection rates, e.g. Poland and Denmark have both a recycling rate of 29%, but the recovered paper collection rates are around 35% in Poland and 60%, respectively, in Denmark.

The recovered paper trade could be another factor influencing the collection rate. A higher deficit implies the need to import recovered paper for the domestic paper and board industry and, consequently, the industry could be urged to improve the situation by increasing the collection rates in their countries. However, no correlation exists between the collection rate and the recovered paper trade balance ($R = 0.028$) (Fig. 2f). The explanation can be that the two factors influence in opposite directions: first, if the trade balance is negative, there is a need to promote a higher recovery of paper, second, the origin of this negative trade balance could be that the paper industry of the country is not able to use the recovered paper. The evolution of trade balance can be a more interesting variable. Accordingly, the evolution of the trade balance between 2000 and 2005 was compared to the collection rate but, again, no correlation was observed ($R = 0.165$) (Fig. 2g), as in the case of the United Kingdom. In this case, although collection is increasing in time achieving the set recovery rates, the utilization is decreasing and the surplus of recovered paper is exported.

Municipal waste generated per capita. In principle, the generated municipal waste can be related to the affluence of the citizens, as well as to their ecological mentality. A very high volume of waste generated could result

in a higher concern for the society on this issue, thus influencing a more restrictive environmental policy and, consequently, a higher recycling activity.³⁷ A significant correlation has been found between the collection rate and the municipal waste generated per capita ($R = 0.704$) (Fig. 2h), in spite of the fact that this is not a good indicator, because of the great differences recorded for similar values of the generated municipal waste. For example, countries with similar generated municipal waste (around 450 kg per capita and year), such as Hungary, Greece or Sweden, have very different collection rates, ranging from the lowest in Europe (around 50% for Hungary or Greece) to the highest (75% in Sweden).

Environmental and quality certifications

ISO 14001 certifications and EMAS registrations represent environmental management systems, permitting to determine the levels of environmental awareness of the companies, but also the legislation and regulation levels in the countries. ISO 9001 has also been studied as quality management systems may be viewed as an indicator of the compromise of the companies towards quality and, probably, towards the environment. As the differences in certificated or registered companies are very high in different European countries, partly because the number of companies depends on the size of the country, the number of certified or registered companies per million of inhabitants has been the variable used to analyse the correlation with the collection rate. All these statistics were obtained from ISO³⁸ and EMAS registrations.³⁹

Another important certification for the paper industry taken into consideration is PEFC certification (PEFC Council – Programme for the Endorsement of Forest Certification schemes – is an independent, non-profit, non-governmental organisation

founded in 1999, which promotes sustainably managed forests through independent third party certification; the PEFC provides an assurance mechanism to purchasers of wood and paper products that they are promoting

by sustainable management of forests). The PEFC-certified forest area cannot be used directly, due to the very different areas of the countries.

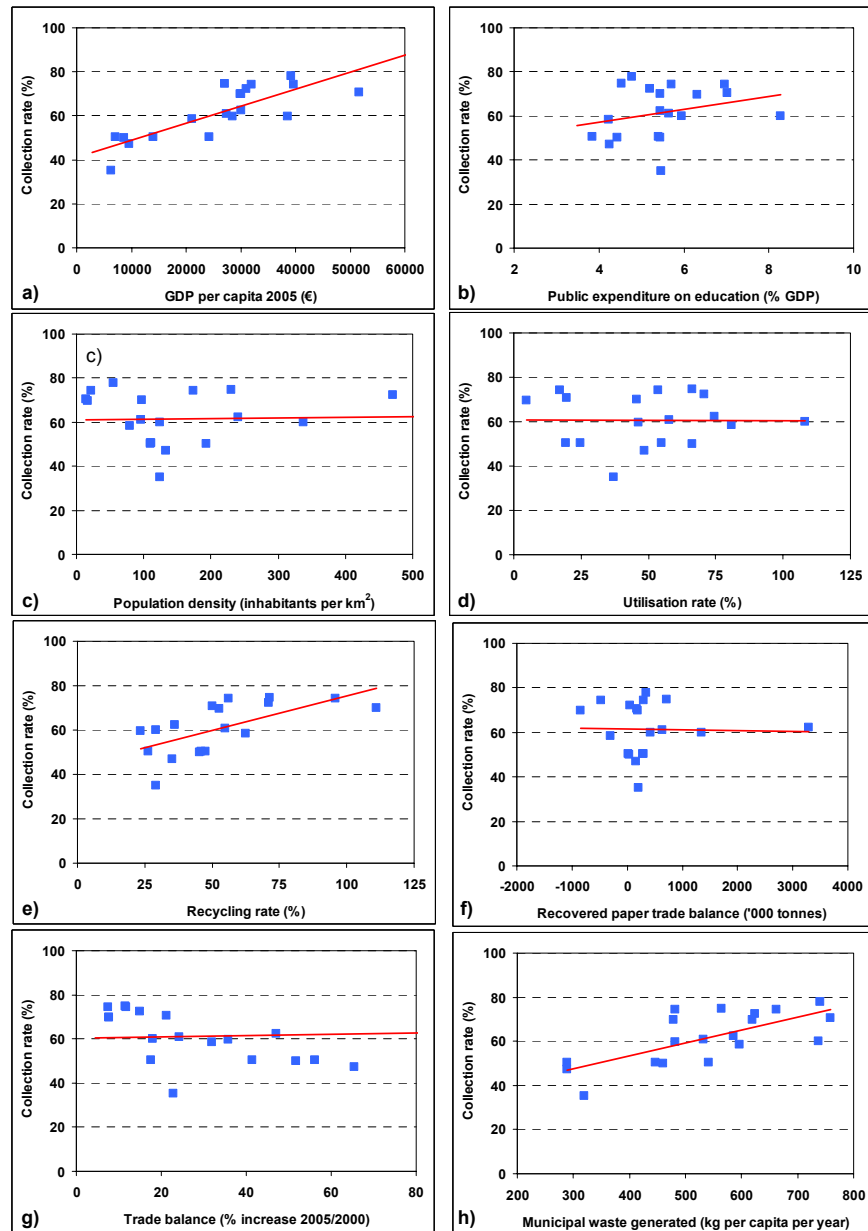


Figure 2: Relationship between collection rate and a) GDP per capita; b) public expenditure on education; c) population density; d) utilisation rate; e) recycling rate; f) recovered paper trade balance (in tons); g) recovered paper trade balance (increase 2005/2000); h) municipal waste generated

For this reason, the % of the total land that is PEFC-certified has been used as indicator, of special importance in the paper industry based on virgin fibre, and also in the environmental awareness of the country. Certified forest area has been obtained through PEFC⁴⁰ for the year 2005. In the

case of environmental management systems, a very weak positive relationship with the collection rate has been observed. As the number of companies per million of inhabitants increases, the collection rate is higher, although this relationship is weak for both ISO 14001 certifications ($R = 0.278$)

(Fig. 3a) and EMAS registrations ($R = 0.344$) (Fig. 3b). For quality management systems, the correlation is even lower and negative ($R = 0.151$) (Fig. 3c). No correlation with the % of land certified by the PEFC system has been observed ($R = 0.006$) (Fig. 3d), although a slight correlation ($R = 0.510$) (not shown) was observed, if the certified area (in hectares) was directly used as an indicator.

Environmental awareness

In this case, the correlation between collection rate and estimated environmental awareness (as estimated in the present study) is very significant, almost as high as the GDP per capita ($R = 0.782$) (Fig. 3e). A higher environmental awareness implies a higher collection rate. Consequently, an extended collection rate can be achieved, with more emphasis on the promotion of environmental awareness in countries with lower environmental awareness, while

information and education is also a continuous necessity in countries with high collection rates.

To clarify the importance of environmental awareness on the recovery of paper, countries have been grouped in three categories (low, medium and high), according to the environmental awareness rate obtained in the study, as follows: low environmental awareness (1.00-1.67): Lithuania, Poland, Hungary, Estonia, Portugal, Bulgaria, Slovakia, Romania, Turkey, Greece and Cyprus; medium environmental awareness (1.67-2.33): Slovenia, Belgium, the United Kingdom, Malta, Ireland, France, Spain, Italy, Czech Republic and Latvia; high environmental awareness (2.33-3.00): Sweden, Germany, the Netherlands, Austria, Switzerland, Denmark, Finland, Luxembourg and Norway.

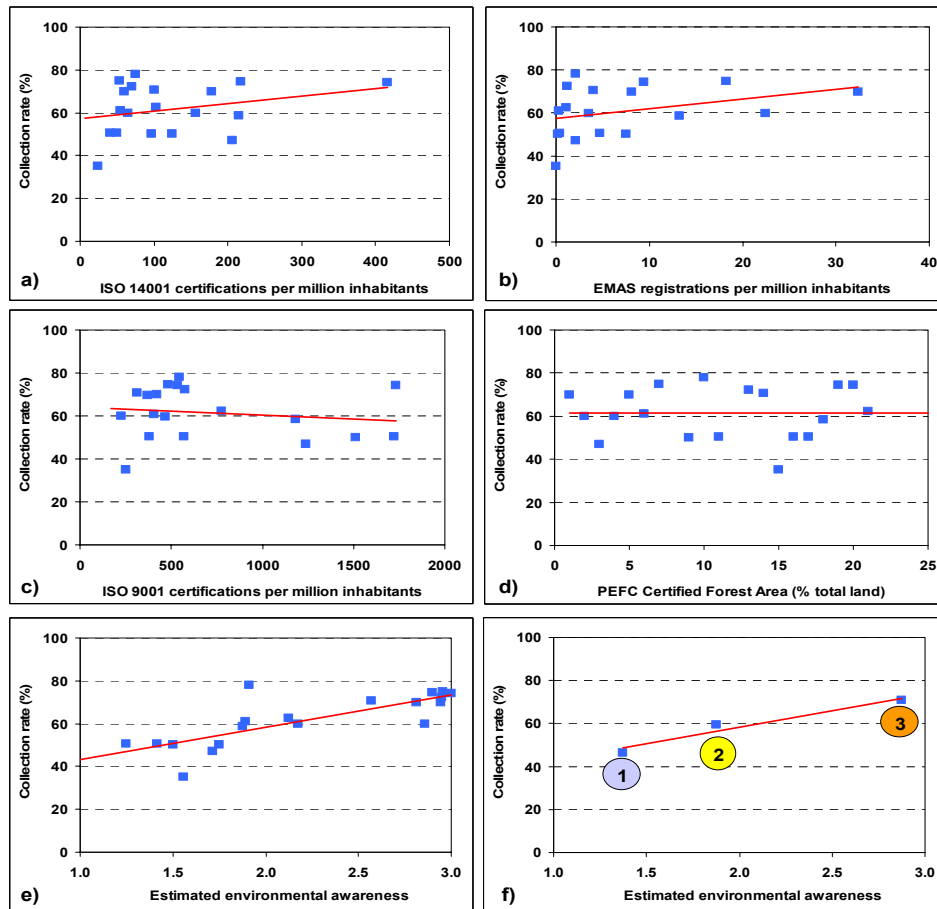


Figure 3: Relationship between collection rate and a) ISO 14001 certifications per million inhabitants; b) EMAS registrations per million inhabitants; c) ISO 9001 certifications per million inhabitants; d) PEFC certified forest area; e) environmental awareness (all countries); f) environmental awareness (by groups of countries)

Table 2
Average environmental awareness and collection rate in 2005 for the three groups of countries analysed

| | Env. awareness | Collection rate (%) |
|---------------------------------|----------------|---------------------|
| Group 1 (Low Env. Awareness) | 1.37 | 46.5 |
| Group 2 (Medium Env. Awareness) | 1.88 | 59.5 |
| Group 3 (High Env. Awareness) | 2.87 | 70.8 |

Table 2 shows the average environmental awareness of the previously mentioned groups and the average collection rate of these countries. It can be seen that, in terms of collection rate (Fig. 1), the three groups of countries are clearly correlated, according to the different degree of development of citizens' environmental awareness ($R = 0.974$) (Fig. 3f).

TOOLS FOR DEVELOPING CITIZENS' ENVIRONMENTAL AWARENESS

As already mentioned, recycling requires investment of time, space, money and effort from the participants in the recycling scheme. Environmental awareness can overcome these difficulties and create the satisfaction of participating in the recycling schemes, increasing participation and making the recycling programme a success.

There are many initiatives around the world to improve the recovery of not only paper, but also other recyclable materials (glass, plastics, cans, textiles, etc.). These initiatives are usually based on improving two issues: the collection infrastructures and the environmental awareness of the citizens.⁴¹ The collection infrastructures are instrumental. It is necessary to ensure that population has access to selective collection, that the number of containers or bins is adequate for the population, that the distances to "drop-off" containers are not long, etc. However, without the participation of citizens in the recycling programmes, all these efforts are useless. As has been mentioned above, the participation in any recycling programme is greatly influenced by motivation, the intrinsically motivated behaviour being the most effective and lasting longer. People who are concerned for the environment are motivated to recycle for internal reasons: recycling makes them feel they are helping to protect the environment.¹⁴

Information and education are keys in developing the environmental awareness of the citizens for achieving a long-term change in consumers' behaviour towards a sustainable society. Besides, the

implementation of recycling schemes must be accompanied by sufficient publicity and promotion, for educating the participants (householders) about how and when to use them.^{12,33}

- There are many actors in the society, involved in the development of citizens' public institutions: governments, municipalities, etc;
- organisations involved in recycling the packaging materials of consumer goods (*Green Dot* system – the license symbol of a European network of industry-funded systems for recycling the packaging materials of consumer goods), e.g. *Packaging Recovery Organisation Europe* (PRO Europe) which is the umbrella organisation for all national organisations that use the *Green Dot* trademark as a financing symbol, and their respective national organisations;
- associations of paper manufacturers, e.g. CEPI at a European level;
- association of collection companies, e.g. ERPA at a European level;
- non-governmental organisations (NGOs), e.g. environmental NGOs, such as *Greenpeace* or *WWF*;
- consumers' organisations, e.g. the *European Consumers' Association* or the respective national consumers' associations;
- community groups;
- researchers, e.g. research projects related to paper recycling, which also include specific programmes to increase the recovery of paper through the promotion of citizens', especially children's, environmental awareness (e.g., the PROLIPAPEL project in Spain).
- environmental awareness, with particular interest in paper recycling. These actors can realize their activities at different levels (national, regional and even local), e.g.:

It is generally agreed that the more actors are involved, the better results will be obtained. The cooperation between different agents (multi-stakeholder approaches to

recycling initiatives), involving NGOs, households, private and public sectors, is mandatory for obtaining the best results.^{11,21}

In fact, numerous measures are carried out as partnership programmes in cooperation with producers, local authorities, NGOs and environmental organisations, recoverers and recyclers, as well as trade representatives.

This section focuses on describing the main tools available for developing citizens' environmental awareness and also for providing experience on the application of these tools in municipal waste solid management, in general, and in paper recycling, in particular.

Generally, environmental awareness is considered to be developed mainly by education and information. Studies have shown that the better informed people are about recycling, the more likely they are to commit to it and feel satisfied with their actions. Thus, whichever the motivation, environmental education, awareness campaigns and positive examples are effective means for developing an environmentally sound behaviour of the people.^{15,42} Environmental education could be accomplished by different means: audio-visual programmes for schools, civic and community groups; educational curricula and class projects; community events, fund raisers and contests. Environmental awareness could be promoted by different channels, such as press conferences and kits, especially when an awareness campaign starts; public service announcements; mass media broadcasts, newspapers, magazines; press releases; printed materials, such as direct mail, newsletters, utility bill inserts, door hangers, posters, bumper stickers.¹⁵

Whilst effective publicity and promotion are essential for a new recycling scheme performance, so is the need to regularly reinforce the recycling message to a perhaps jaded public that probably receives little, if any, tangible reward for voluntary effort.³³ More importantly, regular leaflets help maintain public awareness, which tends to decline if frequent reminders are not utilised.⁴³

Activities are usually focused on two publics: general public and children. Children's education in school is one of the most preferred methods for promoting environmental education and awareness. This is because children are

educated on environmental issues (they are the next generation, the future generation), although it has been demonstrated that the education of children can also influence their parents in recycling.⁴³ Besides, there is often a need to emphasize the publicity of the issues, especially for the lower-recycling groups of the society.⁴³ Prioritizing campaigns to promote recycling on the basis on identifiable and quantifiable patterns of household recycling behaviour are necessary, all distinguishing between the strategies for engaging non-participants in recycling and those for enhancing participant recycling. In the case of engaging non-participants in recycling, it is necessary to reduce the contemporary factors that may cause non-participation (lack of awareness and understanding of the recycling scheme and barriers). In the case of enhancing participant recycling, it would be more appropriate to aim at improving recognition of the targeted materials and support continued recycling rather than aim at enhancing attitudes and understanding.⁴⁵

Another important factor to be considered in information and education activities is the cost. Publicity and promotion make use of various media. Costs will almost certainly dictate which methods are to be employed, leaflet drops and adverts in the local press being among the cheapest and simplest to administer.³³ The expenses for such actions come from the materials used and their distribution. The materials can range from simple flyers, in the case of prompting, to cash lotteries for reward interventions. Once the materials have been prepared, they must be delivered to potential recyclers. Interventions that require contact with each potential recycler (*e.g.*, rewards, individual feedback, and commitment development) are typically more expensive. In contrast, interventions that can be performed without individual contact (*e.g.* group feedback, prompting, removing barriers) are less expensive.¹⁴

The main tools used, including some examples of application, are summarized below. These are classified into those addressed to the general public and those

addressed specifically to children and young people.

General public

Information campaigns

The information campaigns for the general public represent probably the most commonly used method for increasing the citizens' environmental awareness and for promoting recycling behaviour.⁴⁶ The preferred methods are based on using mass media (TV or radio), adverts in the local press, leaflets or brochures delivered to households, billboards and advertisements in public transit locations, posters, etc.^{14,43,47}

The mass media are very influential tools in extending public awareness on environmental issues.⁴⁶ One of the main advantages of these campaigns is that they can be addressed to an important number of citizens, virtually to the whole population of a country, at lower costs compared to other methods for the promotion of recycling.

It is very difficult to decide exactly which method should be preferred and which one will give better results. When considering the media used for promotions, local newspapers for example, are not always the best means for informing the public, while a local authority environmental newspaper can effectively put forward policies and strategies.⁴³ Written messages, such as brochures, may appear as the easiest way to get information across, but they do not necessarily bring about changes in behaviour. Similarly, media (newspaper, radio, television, bus ads and billboards) are useful to promote awareness. Other options, such as leaflet drops and adverts in the local press, are among the cheapest and simplest ways to municipalities to achieve publicity and promotion.³³

One of the main drawbacks in using traditional methods of promotion, such as media campaigns, leaflet drops, newsletters, newspaper adverts, etc., is that they can only achieve a limited success in changing public perception, behaviour and attitude.⁴⁸ The influence of mass media on public opinion has been shown as quite short-lived, because the media coverage jumps from issue to issue, often from day to day.⁴⁶ Adverts in the local press intended to raise awareness, for example, appear to have made little impression on the public, mailshots are often discarded unread as junk mail, etc.³³ For this reason, when traditional methods have failed

to make impression, other promotion methods can be used.^{33,49}

Some examples of information campaigns carried out in Europe are presented below.

- *Green Dot system.* PRO Europe member organisations have carried out numerous environmental awareness campaigns and education partnerships with other actors which, in the area of packaging waste, have contributed to increasing the awareness of the consumer as to the environment and to promoting sustainable development. The *Green Dot* and partner organisations have contributed to the creation of routine attitudes, values and actions, through diverse local, regional and national education programmes and activities. Many of these activities, performed in partnership programmes with manufacturing and retail enterprises, authorities and recycling companies, have reached a large number of European inhabitants and used a wide variety of communication tools, contributing to increasing citizens' environmental awareness. The most important initiatives carried out by the *Green Dot* system can be found in the report entitled "Environmental Education – the Path to Sustainable Development".¹⁷

- *ÖKO-Pannon.* In 2008, *ÖKO-Pannon (Green Dot Hungary)* worked on the preparation and distribution of various means of public information related to selective waste collection and tried to improve and adapt the publications to the demand of the public and of the service provider.⁵⁰ The information brochure entitled "Selectively in Budapest", published in 2008, provides detailed information on the rules of selective waste collection in the capital. It represented a breakthrough in shaping the attitudes of the inhabitants of Budapest. The brochure was delivered to each address in Budapest.

- A self-produced advertisement film was also launched. The campaign entitled *Boomerang* presented the objectives of selection and the results of recovery. It was based on the idea of the boomerang effect: it is not important that you just throw it, it is important how you throw it, thus leading to the conclusion that if you select recyclables properly, they will return "in a more attractive form". The film was broadcast on seven national and cable channels in four versions: it presented the "return", i.e. the recovery of plastic, glass, metal and beverage

cardboard boxes in an idealistic, beautiful natural environment.

- In addition, a selective waste collection road show was organised. This road show arrived in 81 locations and presented the basic rules for selective sorting at households. The show was designed in a playful way to make the message understood by children and families.

- *Latvijas Zalais Punkts*. In 2008, *Latvijas Zalais Punkts* (Green Dot Latvia) edited informative publications for license partners and society (through special sections in some magazines), e.g. “Green” is a quarterly newsletter for clients, which informs its license partners, government and municipality officials and entrepreneurs on the changes and current events in packaging management and legislation. “Green” is distributed as a supplement to “Dienas Bizness” newspaper.⁵¹

- “*Your paper/role is important*” is a national programme designed to improve the collection and recycling of paper and board in Spain, promoted by ASPAPEL, the National Association of Pulp and Paper Manufacturers. The programme mainly focuses on increasing paper collection at a municipal level, where the major potential for an extended collection of recovered paper lies. In this programme, the 150 largest cities of Spain are targeted, with special effort made in the 6 largest cities (Madrid, Barcelona, Valencia, Sevilla, Zaragoza and Málaga) – with an estimation of 70% of the municipal paper consumption in Spain – addressing a total of 25 million people. The programme also includes an improvement of the collection infrastructures with a special agreement with the Spanish *Green Dot* licensing company (*Ecoembes*), which has provided 8.5 million euro for the programme to finance collection infrastructure (“drop-off” containers) and services. This programme also included several campaigns of communication, e.g. “The paper, myths *versus* data”, etc. to enhance knowledge on paper recycling and its associated benefits. Many technical and communication materials, available to anyone, have been developed.

- *Campaigns in the United Kingdom*. The UK’s *Waste Resources and Action Programme* (WRAP) is a major UK programme established to promote resource efficiency. It has launched several campaigns

to improve waste recycling, in general, and packaging in particular, e.g. “*The Big Recycle*”/“*Recycle Now*” or “*Love Food Hate Waste*”. An independent programme especially related to the quality of recovered paper has also been launched, namely “*Campaign for Real Recycling*”, due to the high degree of contamination of recovered paper caused by the spread of commingled collection systems in the UK.

- The “*Big Recycle*” campaign follows a government funded national television advertising campaign encouraging households to recycle more. The campaign website (www.thebigrecycle.com) provides in-depth information on what can be recycled, how it can be recycled and what recycling facilities exist in each region. Since June 2007, “*Recycle Now*” is the new name for “*The Big Recycle*” (<http://www.recyclenow.com>) – a multimedia national recycling campaign, implemented and managed by WRAP on behalf of the government, with the main aim to encourage more people to recycle more stuff and more often. It also provides resources for youth education.

- The *Campaign for Real Recycling*, organised by members of the United Kingdom’s leading materials re-processors, the community recycling sector and *Friends of the Earth*, aims at influencing local authority policy and practice, and at building consensus, in the United Kingdom, on the economic and environmental importance of highly separated collections, not only of paper, but also of other recyclable materials, such as glass, aluminium or textiles. There are serious concerns that the introduction and growth of single stream (co-mingled) collection systems by local authorities and the waste management industry are unsustainable. This development has a negative impact on the quality of the recovered paper, to the detriment of the national industry, and on the long-term sustainability of the global recovered paper markets, in general. Reports and information about this campaign are available at <http://www.realrecycling.org.uk>.

Home advisors

It has been demonstrated that, although print media are influential (for the decision of households to recycle), face-to-face communication is the most effective medium

to convince people to start recycling.²⁹ This is the reason why “door-to-door” services may encourage people to recycle.²¹ As already mentioned, the traditional methods of promotion (including media campaigns, leaflet drops, newsletters, newspaper adverts, etc.) can only achieve limited success in changing public perception, behaviour and attitude. Research in the UK and Canada has shown that using a “door-to-door” home advisor technique for improving participation can achieve a significant positive impact on residential participation and recycling rates.⁴⁹

In this activity, home advisors (specifically selected and trained) visit households, informing the residents on the local waste management strategies (usually, these campaigns are focused on the collection of all recyclables and not only of paper).^{33,49}

A. D. Read⁴⁹ described how a “door-to-door” communication strategy was the only means to increase recycling tonnage and public participation in a doorstep recycling programme carried out in the Royal Borough of Kensington and Chelsea, after traditional communication approaches failed to meet the recycling targets. The *Recycling Road Show* was launched to bring the recycling service and its message to every doorstep in the borough. The recycling unit’s staff knocked on the door of every household in the borough to inform residents of the doorstep recycling service and to attempt at persuading non-recyclers to try the service and to raise general awareness surrounding waste management issues. The programme was very successful, with an increase of around 25% of the volume of materials collected in a short period of time.

M. Grodzinska-Jurczak *et al.*⁴⁸ describe another “home advisors” programme, carried out in the city of Jaslo, in Poland. This educational campaign, informing the residents on the local waste segregation system, was carried out between October 2002 and December 2003 in 687 households. In this case, home advisors were selected from the local schools and trained on the sustainable waste management principles. The campaign proved to be a success, with home advisors having positively influenced the way residents thought and acted towards the wastes they produce. The face-to-face contact and the involvement of young people were well-received and appeared to result in a better response than the traditional methods

of promotion previously used in the city. The education campaign also impacted positively the students’ knowledge on waste issues and provided opportunities for the students’ relatives and the whole local community to become environmentally conscious. After this success, the municipality intends to continue working in the “home advisors” programme, and to assure promotion by traditional methods of communication (leaflets, adverts in the local newspapers, etc.).

Others

There are other initiatives leading to an increase in the awareness on environmental issues, specifically on recycling, such as the organisation of contests and prizes, of road shows and parties, the development of community activities, web pages, etc. Some examples of such initiatives are described below.

Green Dot Week. Each September, *Latvijas Zalais Punkts* (LZP) (Latvian *Green Dot*) organises the *Green Dot Week*, aiming at raising public awareness on issues of saving unrenovable natural resources, stressing the importance of collecting packaging waste, waste electric equipment and goods harmful to the environment, the significance of recycling and the whole set of related problems. The *Green Dot Week* is organised with the active support of municipalities, waste management operators, recycling companies, license partners, NGOs and environmental protection organisations. Various events for children and adults are also organised.⁵¹

Train of Environment. In 2004, The Spanish *Green Dot* organisation (*Ecoembalajes*) dispatched a *Train of the Environment* with a mobile exhibition through 17 Spanish cities. The exhibition, which was visited by more than 113000 people, provided information on the benefits of sustainable development – from the use of clean energy through the protection of forests and oceans to ecological transport and waste separation. The tour was coordinated by the Ministry for the Environment and supported by various organisations and companies.¹⁷

Community activities. A possible tool for developing the citizens’ environmental awareness by community activities is a clean-up campaign, which is an “informal mode of convincing the public”. The object of a clean-up campaign could be a neglected

neighbourhood, a littered park or body of water, or any other locality that needs attention. As at least some of the active participants in the clean-up may have contributed to littering, they will acquire an appreciation of the arduous and thankless nature of the management of solid waste and, in the future, may refrain from littering.⁵²

Web pages. Web pages are usually a complement to information and education programmes. These sites can contain a variety of information, such as what recycling centres are closer to your address, how to sort waste, how to implement a collection system in an office or work centres, etc. Almost all *Green Dot* organisations have information of this type, but there are also more initiatives from national associations of manufacturers, national associations of recovered paper dealers, NGOs, etc.

Children/youth education

School programmes represent the main tool in developing children's environmental awareness. As already mentioned, these initiatives are not only important for educating the next generation, but also for influencing the parents' behaviour. Significant efforts are made for the utilization of new technologies to increase the awareness of youth on environmental issues, such as videogames, mobile learning, educational software, web pages, YouTube, etc., and even social networks, such as Facebook or Myspace.

School programmes

Many organisations have well-established school programmes with carefully reviewed curricula and evaluation methods. School programmes work in several ways: they educate current and future consumers and they can get information home to parents. A limitation is that it is unusual for a school to adopt environmental or recycling activities as part of its regular curriculum. Thus, programmes typically reach students only when teachers request a guest speaker, or when they are able to attend a training session. The idea is to take a playful and educational approach in working with children. In these programmes, curricula, class projects, guide for educators, etc., need to be developed.

Some initiatives that have already been carried out are presented below.

Eco-schools. *Eco-schools* is an international award programme that guides schools on their sustainable journey, providing a framework to help embed these principles into the heart of school life. *Eco-schools* is one of the five environmental education programmes run internationally by the Foundation for Environmental Education (FEE). In addition to *Eco-Schools*, FEE runs *Green Key*, *Young Reporters for the Environment*, *Blue Flag* and *Learning about Forests*. There are 46 countries around the world that run the *Eco-schools* programme, linking more than 40000 schools.

Once registered, schools follow a simple seven-step process, which helps them to address a variety of environmental themes, ranging from litter and waste to healthy living and biodiversity. Schools work towards gaining one of the three awards – Bronze, Silver and the prestigious Green Flag award, which symbolises excellence in the field of environmental activity. Bronze and Silver are both self-accredited through this website, while the Green Flag is externally assessed by *Keep Britain Tidy*.

Les ateliers de Rouletaboule. The aim of this programme is also to foster positive and responsible environmental behaviour among children. *Eco-Emballages* (*Green Dot* France) and the association network *Ecole et Nature* have been successfully implementing this comprehensive educational programme in French municipalities, for ten years. More than two million children in over 1000 municipalities have already taken part. At various workshops, the 3 to 14-year olds learn about the effects of packaging on the environment and work together to find solutions. They also learn to argue their case in democratic debates. The objective of the project is to identify the responsibility of each individual for his or her consumer habits and attitudes to waste. *Eco-Emballages* has also entered a partnership with the educational publisher, *Nathan*, to develop class room sessions with practical exercises on subjects of waste, CO₂ and water, specifically for primary school teachers.¹⁷

“What’s up?” and “Dawn”. ÖKO-Pannon (*Green Dot* Hungary) has already carried out programmes for improving the environmental education of pupils and nursery-school children. In 2008, a nationwide, gap-filling drama programme for secondary-school students, entitled *“What’s*

up?”, was launched. It reinforced the environmental responsibility of the youth by means of role-play, instead of applying conventional didactic methods to impart knowledge. The fairy play entitled “Dawn”, which is becoming very popular among preschool children, was performed 100 times in 2008. The educational materials for primary school and preschool aged children also remained very popular. For elementary school children, these materials included cartoons, exercise books, brochures, educational posters, etc. For nursery-school children, they include colouring books, story books and exercise books. The teachers are helped by guides, CD-Rom educational presentations and the educational film “The cycle of waste”.⁵⁰

Green Dot School. This programme is organised by *Latvijas Zalais Punkts (LZP) (Green Dot Latvia)* with the objective of increasing pupils’ knowledge on ecological issues, strengthening their sense of responsibility for the environment and promoting an environmentally friendly lifestyle.⁵¹ Every school year, various creative and educational contests for children and training seminars for teachers are held within the framework of the project. LZP has published several study-aids and work books, providing teachers with interesting, practical and creative ideas on how to work with their pupils on environmental issues. LZP has prepared and distributed a very useful visual aid, “Packaging Samples Bag”, for schools. The bag contains four buckets with samples of plastic, glass, paper and metal packaging and recycled materials. In the academic year 2007/08, approximately one third of the Latvian schools with more than 91000 pupils participated in the *Green Dot Programme*.

Informative publications for license partners and society (through special sections in some magazines) have been developed. In the case of youth, two publications have been developed. The first, launched in 2005, was described in youth magazine “Target”. In the project, five areas of environmental protection – water, air, waste, food, energy – were covered in six months, offering young people insight into the issues now topical in each field. Another initiative was carried out by the magazine “Spicite”, which involved the publication of “Greetings on starting school!”, especially dedicated to 1st and 2nd graders. The aim was to acquaint children with sorting. LZP placed a comic strip in the

publication, with the adventures of Zakis-Trakis (Mad Hare), demonstrating how to sort packaging waste every day. The publication was distributed for free to 38000 people across Latvia.

“Your paper/role is important”. As mentioned earlier, this is a large national project promoted by ASPAPEL in Spain. Apart from the specific target of increasing the collection of used paper at a municipal level, this programme has also included specific actions for improving youth education on paper recycling and for implementing the collection of used paper in schools. The objective is to acquire daily habits of separating the paper to be collected and then doing the same at home. For that, more than 100000 especially designed board eco-bins have been placed in the classrooms of thousands of schools. Besides, many technical and communication materials have been developed, which can be used by anyone and are available upon request or by accessing a web page (<http://www.tupapelesimportante.com>). On this web page, there are specific materials helping to organise and promote recycling of paper and board in schools, as well as educational guides for teachers.

The paper journey. This is another specific Spanish campaign related to paper recycling, organised by REPACAR, the National Association of Recovered Paper Dealers. The objective of this campaign is to develop public awareness, through a cartoon series on paper recovery and recycling, presenting the environmental benefits of paper and board recycling. The targets of this campaign are school aged children and their teachers and parents.

Paper Chain Forum. In Belgium, the Paper Chain Forum has created a programme to increase awareness on paper and to motivate people to deal with this precious asset in a sensible way.³ The Belgian Paper Chain Forum, an information platform comprising 12 paper-related professional associations, developed an educational project in collaboration with the NGO “Green Belgium”, targeting young people in primary schools. In this project, 8 to 12-year-old pupils are informed on how the paper chain functions. The pupils gain insight into the production of paper and board, as well as into sustainable forest management and the balance between virgin fibres and recycling. During the school year 2008/09, 30 schools

enrolled in this initiative, with each school receiving a three half-days training.

Wastebuster Campaign (within "Recycle Now" programme). *Wastebuster* is a video-rich, multi-media teaching resource with cross-curricular films, activities and a web site, designed to motivate pupils and support teachers in the United Kingdom. These resources can be delivered to schools. *Wastebuster* aims at making waste minimisation a cool routine pastime to children. Teachers' resources and a specific area for kids are provided on the web page (<http://www.wastebuster.co.uk>).

Use of new technologies (software, mobile technologies, etc.)

These tools are oriented to young people rather than to children. New technologies can attract young people more than the traditional ways of education.

Development of educational software. Some examples of educational software focusing on environmental themes may be found in literature. For instance, a software, in the form of an interactive book, starts from the famous children's story "The three little pigs", to explore environmental themes.⁵³ The suite is completed by some games, which verify the users' understanding of the treated themes. The developed software is usable both as stand-alone software and, *via* the internet, embedded in a web page. Tests of the suite have been performed on a group of primary school students and the efficiency of the software has been proven through its high interactivity level, encouraging the users' comprehension of the treated themes, but also suggestions from other authors for future developments.

Mobile learning. Mobile learning implies the use of mobile technologies, data services and multi-media messaging systems for learning purposes. Even the use of attractive systems for young people such as YouTube, Facebook, My Space, etc. can be of interest. Mobile learning or m-learning has increasingly attracted the interests of educators, researchers and companies that develop learning systems and publish instructional materials. There are a few examples in the literature on the application of mobile learning for developing the environmental awareness of youth. H. Uzunboylyu *et al.*⁵⁴ studied in Cyprus the efficiency of a programme based on m-learning in developing students'

environmental awareness. Students participated voluntarily in a six-week programme using mobile telephones to transmit photographs of local environmental blights and to exchange pictures and observations. There were 41 participants, with the average age of 21, all of them enrolled in computer education classes at the Near East University in Cyprus. The study investigated the use of integrating mobile telephones, data services (*i.e.* WAP, SMS and MMS) to increase students' use of mobile technologies and to develop environmental awareness. The efficiency of these technologies was evaluated by questionnaires addressed to the participants, which demonstrated that the use of m-learning technologies resulted in the students' higher regard for environmental issues.

Other actions: Youth Eco-Parliament (PRO EUROPE)

The *Youth Eco-Parliament* (YEP) is an environmental education programme initiated in 2004 by PRO EUROPE, in partnership with the *Ecole et Nature* network, with the aim of encouraging sustainable development in Europe. Believing that youngsters from different countries can share a common educational approach and take an active part in today's society on environmental issues, YEP was created to enable young people to act alongside adults to protect the environment, as well as to offer them an opportunity to experience a form of democracy, exercise citizenship and open their minds to environmental issues. YEP aims at helping participants develop skills in observing and finding solutions for environment issues. It teaches youngsters to put environmental values first and encourages them to become involved both individually and at a group level in the social and political life of their country and planet. The programme is also characterised by a multi-cultural dimension realised by exchanges among different countries and by the recognition of each culture's values. Finally, through the experience of this project, the young people have found it has made them aware of the financial challenges involved by a sustainable management of our environment.

The educational programme of the *Youth Eco-Parliament* is based on three pillars: a) a collaborative writing programme developed

along an entire school year with students and teachers from across Europe and beyond, b) national and international meetings of student delegates who discuss their local environmental projects and present the collaborative efforts of their work to adults, and c) an exchange of ideas on the Internet via discussion forums or chat. The *Youth Eco-Parliament* is an environmental education project aimed at encouraging sustainable development in Europe.

The first two editions of the YEP brought young people from more than 14 European countries together, to discuss the environmental challenges of our times and the possible actions for the future. The 1st YEP outcome took the form of a White Paper on the environment, containing resolutions and proposals for actions on air, water, waste, energy and food. In 2006, the 2nd YEP involved more than 3600 students, who collaboratively drafted 7 Open Letters on the environment, addressed to influential representatives from the civil society (*i.e.* producers, politicians and civil servants, researchers and scientists, educators, journalists, NGOs and international organisations). More information can be found on the web page <http://www.eyep.info>.

CONCLUSIONS

Environmental awareness is still the main factor influencing paper recovery in European countries. The use of an expert panel for determining the environmental awareness of the different European countries has been demonstrated as a very useful evaluation method with a very low standard deviation of the panel responses.

The most critical factor to be first addressed for extending the recovery of recyclables varies depending on the countries and on the level of participation in recovery systems. Generally, in countries with a low collection rate, the citizens' environmental awareness needs to be addressed first, while, in countries with already high collection rates (as well as high citizens' environmental awareness), an improvement of the collection systems represents a key to continuing the expansion of paper recovery. It is important to notice that environmental awareness affects not only collection, but all stages in the paper recycling value chain, more precisely, the citizens' higher environmental awareness can push municipalities and other institutions (offices, schools, etc.) towards

promoting recycling and improving the resources used for the collection of these materials.

A large variety of tools are available for promoting the development of awareness, always based on improving information and education. Studies have shown that the better informed people are about recycling, the more likely they are to commit to it and feel satisfied with their actions. The development of awareness can be carried out through various media depending on the target group: the general public, children or young people. Information campaigns addressed to the general public are based on mass media (TV or radio), adverts in the local press, leaflets or brochures, etc. Children and youth education is mainly performed through school programmes. It does not only develop the environmental awareness of the future generation, but also influences the parents' attitudes and behaviour. Regardless of the type of campaign used, the more actors are involved, the better results are obtained: NGOs, municipalities, households, recoverers and recyclers, etc. should work together through partnership programmes.

In the case of paper recycling, the main efforts have been carried out by public institutions (municipalities, etc.), the *Green Dot* organisations and other members of the paper recycling chain, such as associations of manufacturers or recovered paper dealers.

ACKNOWLEDGEMENTS: The authors want to express their gratitude to all participants of the COST Action E48 "The limits of paper recycling", and especially to the members of the Task Force "Collection systems": Andreas Faul (INGEDE), Alf-Mathias Strunz (PTS) and Giorgio Capretti (SSCCP). They also acknowledge the financial support of the PROLIPAPEL-CM project (S-505/AMB/0100) by the Community of Madrid (Spain), and the help of Donald MacNeil with the review of the English version of the paper.

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